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FEE TRANSMITTAL For FY 2005		Application Number	10/765,252
		Filing Date	January 27, 2004
		First Named Inventor	Thomas G. Rukavina
		Examiner Name	Thao T. Tran
		Art Unit	1711
		Attorney Docket No.	3152-035031
<input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.151			
TOTAL AMOUNT OF PAYMENT		(\$ 500.00	

METHOD OF PAYMENT (check all that apply)

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FEE CALCULATION

1. BASIC FILING, SEARCH, AND EXAMINATION FEES

Application Type	FILING FEES		SEARCH FEES		EXAMINATION FEES		Fees Paid (\$)
	Fee (\$)	Small Entity Fee (\$)	Fee (\$)	Small Entity Fee (\$)	Fee (\$)	Small Entity Fee (\$)	
Utility	300	150	500	250	200	100	
Design	200	100	100	50	130	65	
Plant	200	100	300	150	160	80	
Reissue	300	150	500	250	600	300	
Provisional	200	100	0	0	0	0	

2. EXCESS CLAIM FEES

Fee Description	Small Entity Fee (\$)	Small Entity Fee (\$)
Each claim over 20 or, for Reissues, each claim over 20 and more than in the original patent	50	25
Each independent claim over 3 or, for Reissues, each independent claim more than in the original patent	200	100
Multiple dependent claims	360	180

Total Claims	Extra Claims	Fee (\$)	Fee Paid (\$)	Multiple Dependent Claims	Fee (\$)	Fee Paid (\$)
- 20 or HP = _____ x _____ = _____						
HP = highest number of total claims paid for, if greater than 20						
Indep. Claims	Extra Claims	Fee (\$)	Fee Paid (\$)			
- 3 or HP = _____ x _____ = _____						
HP = highest number of independent claims paid for, if greater than 3						

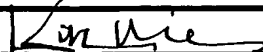
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If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

Total Sheets	Extra Sheets	Number of each additional 50 or fraction thereof	Fee (\$)	Fee Paid (\$)
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4. OTHER FEE(S)

Non-English Specification,	\$130 fee (no small entity discount)	
Other: <u>Appeal Brief Filing Fee</u>		500

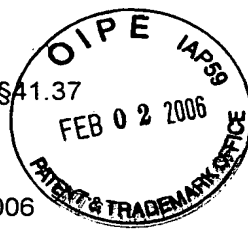
SUBMITTED BY			
Signature		Registration No. (Attorney/Agent)	37,891
Name (Print/Type)	Kirk M. Miles	Telephone	412-471-8815
		Date	January 30, 2006

This collection of information is required by 37 CFR 1.136. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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Response Under 37 C.F.R. § 41.37
Appellant's Brief

Application No. 10/765,252
Paper dated: January 30, 2006
PPG Docket No. 1908A1



**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

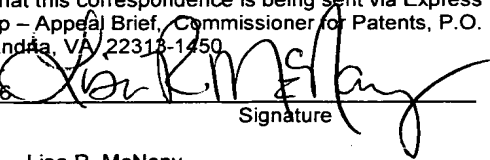
In re: Patent Application of	:	PATENT APPLICATION
Thomas G. Rukavina	:	
	:	
Serial No.: 10/765,252	:	Group Art Unit: 1711
	:	
Filed: January 27, 2004	:	Examiner: Thao Tran
	:	
For: Urethane Polyol Precursors for	:	PPG Docket No.: 1908A1
Coating Compositions	:	

MAIL STOP APPEAL BRIEF – PATENTS

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

**ON APPEAL FROM THE PRIMARY EXAMINER TO THE
BOARD OF PATENT APPEALS AND INTERFERENCES**

APPELLANT'S BRIEF UNDER 37 C.F.R. § 41.37

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I

REAL PARTY IN INTEREST

The real party in interest in this Appeal is PPG Industries Ohio, Inc., a corporation of the state of Delaware, having acquired rights by way of an assignment executed on July 21, 2004, and recorded in the U.S. Patent and Trademark Office at reel and frame number 015609/0301 on July 28, 2004.

II

RELATED APPEALS AND INTERFERENCES

As the legal representative of Appellant, the undersigned attorney has no knowledge of any appeals or interferences directly related to this Appeal.

III

STATUS OF CLAIMS

Claims 1-23 are currently pending in this application.

Claims 1-6 and 8-9 stand finally rejected under 35 U.S.C. §102(b) as allegedly anticipated by Reich et al. U.S. Patent No. 4,187,089 (hereinafter "Reich") in an Office Action mailed August 31, 2005 ("Final Office Action").

Claims 7 and 10-23 stand finally rejected under 35 U.S.C. §103(a) as allegedly obvious over Reich in the Final Office Action.

All of claims 1-23 are at issue in this Appeal.

IV

STATUS OF AMENDMENTS

No claims were amended after final rejection. A copy of the claims involved in this Appeal in their current form is contained in the Claims Appendix attached hereto.

V

SUMMARY OF CLAIMED SUBJECT MATTER

Several embodiments of Applicant's invention are set forth in independent claims 1, 10, and 20 of this application. Generally, the present invention is directed to prepolymers used in the formation of coating compositions, as well as coating compositions manufactured from such prepolymers and products coated with such compositions. The prepolymers represent unsymmetrical polyurethane polyols in the form of a low viscosity, non-crystalline substantially 100 percent solids material, and in particular trimeric or highly oligomeric polyols prepared as a reaction product of a diisocyanate with a short chain aliphatic diol and a long chain polymeric diol. The prepolymers are particularly useful as a first component polyol for reaction with a second component polyisocyanate in a two-component coating composition.

Claim 1 specifically defines a trimeric unsymmetrical polyurethane polyol represented by the reaction product of a diisocyanate, an aliphatic diol having 1-6 carbon atoms, and a polymeric diol having at least one oxycarbonyl linkage and having from 5-20 carbon atoms. [See specification at paragraph 0013]. Claim 1 also defines the polyurethane polyol as including hydroxyl termination. [See specification at paragraph 0018, where it is noted that "the diisocyanate and the short chain aliphatic and long chain polymeric diols are reacted in such a way so as to result in a hydroxyl-terminated polyurethane prepolymer"]. In this manner, the claimed reaction product clearly represents a polyol, which is particularly useful as a precursor used in a later reaction. Moreover, the unsymmetrical nature of the polyol is established through the claimed reaction of the diisocyanate with both the aliphatic diol and the polymeric diol. Desirably, the aliphatic diol is a short chain diol having an odd number of carbon atoms, while the polymeric diol is desirably a polycarbonate diol or a polycaprolactone diol.

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Independent claim 10 defines a further embodiment directed to a coating composition comprising the reaction product of such a hydroxyl-terminated polyurethane polyol precursor with a separate polyisocyanate. [See specification at paragraph 0021]. In particular, claim 10 defines the reaction product of a first component represented as a hydroxyl-terminated polyurethane polyol precursor such as defined by claim 1 (representing the reaction product of a diisocyanate, an aliphatic diol and a polymeric diol), reacted with a separate polyisocyanate. Such a coating composition as claimed in claim 10 is particularly useful in combination with a substrate such as glass or, more desirably, a polymeric sheet, to form a cured layer thereon.

Independent claim 20 defines a substrate coated with such a coating. [See specification at paragraph 0024]. Examples of useful substrates include glass and polymeric materials such as a polycarbonate sheet.

VI

GROUND OF REJECTIONS TO BE REVIEWED ON APPEAL

- I. *Are claims 1-6 and 8-9 anticipated under 35 U.S.C. § 102(b) by U.S. Patent No. 5,563,233 to Reich?*
- II. *Are claims 7 and, 10-23 obvious under 35 U.S.C. § 103(a) over U.S. Patent No. 5,563,233 to Reich?*

VII

ARGUMENT

- I. *REICH FAILS TO TEACH OR DISCLOSE EACH AND EVERY ELEMENT OF CLAIMS 1-6 AND 8-9, AND THEREFORE DOES NOT ANTICIPATE CLAIMS 1-6 AND 8-9.*

Claims 1-6 and 8-9 stand finally rejected under 35 U.S.C. §102(b) as anticipated by Reich. In the Final Office Action, the Examiner specifically states that "Reich teaches a coating composition, comprising a polyurethane polyol precursor comprising the reaction product of a diisocyanate, such as

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trimethylhexamethylene diisocyanate; a diol, such as ethyl 1,3-hexanediol; a polycarbonate diol; and water.” The Examiner then concludes that “[s]ince the reference uses the same chemical components in the same ratios, the reaction product of the reference would inherently be the same, i.e., it would have hydroxyl terminal [sic] as presently claimed.” (Final Office Action at p. 3)

A. The Claims Require A Polyol Having Hydroxyl Termination - Reich Discloses A Fully Cured Polyurethane Polymer, NOT A Polyol

Anticipation under 35 U.S.C. §102 “requires the presence in a single prior art disclosure of all elements of a claimed invention arranged as in the claim...a disclosure that ‘almost’ meets that standard does not ‘anticipate’.” Connell v. Sears, Roebuck & Co., 722 F.2d 1542, 1548, 220 USPQ 193, 198 (Fed. Cir. 1983). In other words, for anticipation under 35 U.S.C. §102, the reference must teach every aspect of the claimed invention either explicitly or impliedly. MPEP §706.02. Any feature not directly taught must be inherently present. MPEP §706.02. With respect to chemical cases, a prior art reference must clearly and unequivocally disclose the claimed compound or direct those skilled in the art to the compound without any need for picking, choosing, and combining various disclosures. In re Arkley, 455 F.2d 586, 587, 172 U.S.P.Q. 524, 526 (CCPA 1972).

Independent claim 1 of the present application specifically recites a polyol represented as the reaction product of certain components, with the polyol defined as including hydroxyl termination. Quite simply, Reich fails to teach or disclose formation of a polyol having hydroxyl termination, as claimed in claim 1.

More particularly, claim 1 specifically requires a polyurethane polyol with terminal hydroxyl groups. The polyol precursor of claim 1 represents the reaction product of specific diol(s) with a diisocyanate. The reaction is controlled so as to produce a polyol as the reaction product, including

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hydroxyl termination. By providing the reaction product as a diol with hydroxyl termination, the polyol produced through this reaction includes reactive groups, namely the hydroxyl terminal groups, as functional groups for a subsequent reaction. Since the reaction scheme involves reacting diols with a diisocyanate, the product produced is a polyurethane. However, it is not a fully reacted polyurethane polymer, since the reaction scheme is controlled so as to limit the reaction and form a polyol as the product of the reaction scheme. Accordingly, the polyurethane polyol reaction product represents a precursor or an intermediate product which includes hydroxyl termination. This polyol precursor can later be reacted in a further reaction, such as with a separate polyisocyanate in a polyurethane polymerization to form a fully cured polyurethane polymer.

On the other hand, Reich teaches the formation of a conventional, fully cured polyurethane polymer, and does not teach or disclose any partial reaction to form a polyol having hydroxyl termination as a precursor or intermediate product for further reaction. Specifically, Reich reacts a diisocyanate with one or more diols, in the presence of water, to form a fully cured polyurethane polymer gel in accordance with conventional polyurethane polymerization. No precursor or intermediate polyol having hydroxyl termination is formed nor is even contemplated by Reich.

B. Reich Reacts Specific Components To Form A Fully Cured Polymer Gel End Product, Whereas Claim 1 Reacts Similar Components (In A Different Manner) To Form A Different End Product, Namely A Polyol

The Examiner fails to point to any specific teachings of Reich which teach or disclose the reaction product of claim 1 which clearly recites a polyol having hydroxyl termination. Instead, the Examiner alleges that Reich uses the same chemical components in the same ratios, and incorrectly concludes that "the reaction product of the [Reich] reference would inherently be the

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same, i.e., it would have hydroxyl terminal [sic] as presently claimed.” (Final Office Action at page 3.) Applicant submits that merely disclosing similar reaction components does not support a finding that a reference inherently anticipates a reaction product which includes claim limitations that are not disclosed in that reference.

To support an anticipation rejection based on inherency, an examiner must provide factual and technical grounds establishing that the inherent feature *necessarily* flows from the teachings of the prior art. See Ex parte Levy, 17 U.S.P.Q.2d 1461, 1464 (Bd. Pat. App. & Int. 1990). Inherency must flow as a necessary conclusion from the prior art, not simply a possible one. In re Oelrich, 666 F.2d 578, 581, 212 USPQ 323, 326 (CCPA 1981). The mere fact that a certain thing may result from a given set of circumstances is not sufficient. Continental Can Co. USA, Inc. v. Monsanto Co., 948 F.2d 1264, 1268-69, 20 USPQ2d, 1746, 1749 (Fed. Cir. 1991).

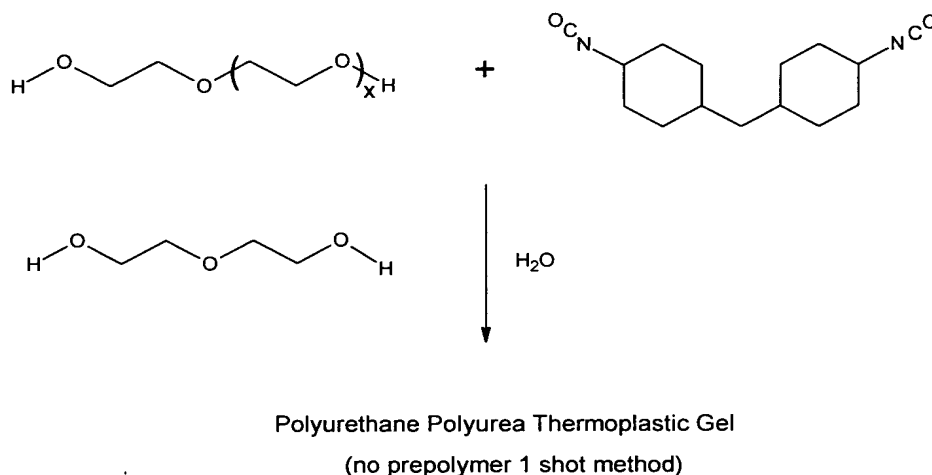
Reich teaches the formation of a polyurethane gel polymer. Reich's hydrophilic polyurethane polymer is intended for use as a gel for burn or wound dressings, electroconductive pads, high slip materials, and surgical implants. The polymer gel of Reich can also be combined with other additives and fillers to form face creams and antiperspirants. While Reich forms such a polyurethane gel through polymerization of an isocyanate and one or more diols, the reaction scheme taught by Reich fully reacts the isocyanate and diol reactive groups to form a fully polymerized polyurethane gel. Reich does not even suggest limiting or controlling the reaction to form a partially reacted product with functional groups remaining, such as the polyol having hydroxyl termination as in claim 1. To the contrary, the overall invention in Reich involves a critical selection of the amount of water in the reaction mixture (see abstract; col. 2, lines 55-57; col. 4, lines 15-16). In this manner, the reaction product formed by reacting the diol(s), various glycols, polyether polycarbonate, water (or amine) and the isocyanate is a fully cured polyurethane polymer, with all of the hydroxyl functional groups of the diols

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being reacted and no terminal hydroxyl groups remaining on the thus formed reaction product.

By way of example, the following reaction scheme demonstrates the teachings of Reich:

REICH



As is apparent, with respect to urethane reactions involving diols, Reich is teaching a full polyurethane reaction to form a fully reacted gel with no prepolymer formation whatsoever.

This is entirely contradictory to the present invention involving formation of a polyol with hydroxyl termination, in which the reaction is controlled so as to only react one end of the diols to thereby form a polyol having hydroxyl termination. In fact, in the present invention, the reaction scheme is controlled so as to produce the polyol as the reaction product by reacting the diisocyanate with a stoichiometric excess of a short chain diol and a longer chain polymeric diol under anhydrous conditions, as discussed at paragraph [0018] and in the examples of the application. For example, the

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polyol is formed with the short and long chain moieties linked together through urethane linkages (derived from the diisocyanate), and with terminal hydroxyl groups extending from either end of the polyol. This first reaction occurs to form the polyol, not a fully cured urethane polymer.

As demonstrated through these reaction schemes, Reich fails in any way to teach or disclose a reaction to form such an unsymmetrical polyol, which includes terminal hydroxyl groups. In fact, there is nothing in Reich which teaches, discloses or even remotely suggests the formation of a trimeric urethane polyol having a short chain hydroxyl termination at one end and a long chain hydroxyl termination at the other end based on the reaction of a diisocyanate with an aliphatic diol and a polymeric diol. Instead, the goal of Reich is to react all of the reactive groups, i.e. the hydroxyl groups of the diols, so as to form a polymer, not a polyol.

As noted above, inherency must flow as a necessary conclusion from the prior art, not simply a possible one. In re Oelrich. A polyol having hydroxyl termination, as **claimed** in the present invention, is not necessarily formed from the teachings of Reich involving a reaction scheme including specific ingredients, particularly when the intent of Reich is to form a fully reacted polyurethane gel. Reich necessarily forms a fully cured polyurethane polymer gel due to the controlled reaction and the components used therein. Contrary to the Examiner's assertion, there is no teaching in Reich which would even remotely suggest that a polyol could be formed from the reaction mechanism disclosed therein, let alone an inherent teaching that a polyol must be formed from such a reaction. The Examiner's allegation that Reich produces a polyol having hydroxyl termination as a reaction product is unfounded and is in contrast to the intent of the teachings of Reich, which is to carry out a polymerization in which all of the hydroxyl functional groups are reacted in a single reaction to produce a fully cured tough gel polymer.

It is apparent from the above discussion that Reich fails to teach or disclose the formation of a polyol having hydroxyl termination, let alone the trimeric unsymmetrical polyol recited in claim 1. Further, such a polyol would

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not be inherently formed from the reaction disclosed in Reich, particularly since Reich forms a fully reacted polyurethane gel polymer and controls the reaction so as to ensure complete polymerization to achieve gel formation. As such, Reich fails to teach or disclose, either explicitly or inherently, all of the limitations of claim 1, and therefore does not anticipate claim 1. Since claims 2-6 and 8-9 depend directly from claim 1, Reich also fails to anticipate such dependent claims.

II. CLAIMS 7 AND 10-23 ARE NOT RENDERED OBVIOUS UNDER 35 U.S.C. § 103(a) BASED ON U.S. PATENT NO. 5,563,233 TO REICH

The Examiner contends in the Final Office Action that "Reich teaches a coating composition, comprising a polyurethane polyol precursor comprising the reaction product of a diisocyanate, such as trimethylehexamethylene diisocyanate; a diol, such as ethyl 1, 3-hexanediol; a polycarbonate diol; and water." The Examiner also points to various sections of Reich with respect to different constituents claimed in the dependent claims, alleging that such disclosure renders obvious independent claims 10 and 20, and the dependent claims which depend therefrom, as well as dependent claim 7 which depends from independent claim 1.

Applicant has previously argued during prosecution that Reich does not teach or suggest the claimed reaction product comprising a polyurethane polyol having hydroxyl termination, or the use of such a polyol for further reaction to form a coating composition. In response to Applicant's arguments, the Examiner alleges in the Final Office Action that "Reich discloses a reaction product comprising a mixture of the same diol component and organic diisocyanate as presently claimed. Thus, the reference teaches the same product as claimed." (Final Office Action at page 5.) The Examiner, however, has failed to establish a prima facie case of obviousness.

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A. *The Claims Require A Hydroxy-Terminated Polyol Precursor As A Reactive Component - Reich Fails to Disclose Or Suggest Such A Component*

When making a rejection under 35 U.S.C. §102(b) or §103(a), the Examiner has the burden of establishing a prima facie case of obviousness. In re Fritch, 23 U.S.P.Q.2d 1780, 1783 (Fed. Cir. 1992). The Examiner can satisfy this burden only by showing an objective teaching in the prior art, or knowledge generally available to one of ordinary skill in the art, which would lead an individual to combine the relevant teachings of the references [and/or the knowledge] in the manner suggested by the Examiner. Id.; In re Fine, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988). The mere fact that the prior art could be modified does not make the modification obvious unless the prior art suggests the desirability of the modification. In re Fritch, 23 U.S.P.Q.2d at 1784; In re Laskowski, 10 U.S.P.Q.2d 1397, 1398 (Fed. Cir. 1989); In re Gordon, 221 U.S.P.Q. 1125, 1127 (Fed. Cir. 1984).

Independent claims 10 and 20 define a coating composition and a substrate coated with a coating, respectively, with both claims defining the coating as the reaction product of a hydroxyl-terminated polyurethane polyol precursor and a polyisocyanate. The polyol precursor is defined as the reaction product of a diisocyanate, an aliphatic diol and a polymeric diol in a similar manner as claim 1, thereby forming a hydroxy-terminated polyurethane polyol precursor. Thus, claims 10 and 20 (and the respective dependent claims) define the reaction product of claim 1 (a hydroxyl-terminated polyol precursor) as a first component of a composition, which is then further reacted with a separate polyisocyanate component to form the coating composition as a separate reaction product, for use on a substrate. Such a further reaction is also shown in the reaction scheme depicted above as Rukavina on page 8. In particular, the intermediate 1 representing the polyol precursor is further reacted with the polyisocyanate (shown as an isocyanate trimer) in a second reaction.

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The Examiner has failed to demonstrate how Reich discloses or even suggests either 1) a hydroxy-terminated polyol precursor as a first reaction product of a diisocyanate and two distinct diols, or 2) a second reaction product formed by reacting such a hydroxy-terminated polyol precursor with a separate polyisocyanate to form a polyurethane polymer as a coating composition. At most, Reich teaches a reaction involving an isocyanate and two diols, which forms a fully cured polyurethane polymer gel. There is nothing in the teachings of Reich, however, which would lead one skilled in the art to consider a first reaction of two diols with a diisocyanate which is controlled so as to form a polyol precursor with hydroxyl termination, followed by a second reaction of such a hydroxyl-terminated polyol precursor with a further polyisocyanate to form a polyurethane polymer as a coating composition. This is further exemplified in the reaction scheme shown above where it is apparent that the present invention involves a first reaction to form a polyol, followed by a second reaction of that polyol with a second isocyanate to form a final product. Reich's basic reaction does not disclose or suggest such claimed features.

To establish a prima facie case of obviousness, the prior art reference or combination of references must teach or suggest all the limitations of the claims. See In re Wilson, 424 F.2d 1282, 1385, 165 USPQ 494, 496 (CCPA 1970). The Examiner's mere allegation that using the same components teaches the claimed reaction product does not meet this burden. Independent claims 10 and 20 clearly recite one of the components as being a "hydroxyl-terminated polyol" which is the reaction product of an isocyanate and two separate diols. Reich does not teach or even suggest such a hydroxy-terminated polyol as a reaction component with an isocyanate, but instead teaches conventional diols as reactants with a diisocyanate. Moreover, Reich does not teach or suggest that such a hydroxyl-terminated polyol is formed as an intermediate during the reaction scheme to be further reacted with an isocyanate, and Applicant submits that the reaction scheme disclosed in Reich would not form such a polyol precursor as an intermediate.

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Quite simply, Reich teaches different reactants than claims 10 and 20 (i.e., basic diols reacted with an isocyanate as compared with a trimeric polyurethane polyol with a diisocyanate), and consequently forms a different end product (i.e., the polyurethane chain propulcation occurs differently due to the different reaction schemes).

The Examiner has failed in any way to demonstrate how Reich teaches the first reaction product of a polyol precursor having hydroxyl termination as claimed, let alone the use of such a precursor in a subsequent reaction scheme with a separate polyisocyanate to form a coating composition. Instead, the Examiner has merely concluded that the reference must teach the same reaction product because it uses similar components. Merely combining a specific diisocyanate with specific diols and controlling the reaction to produce a specific fully cured polyurethane gel is very different than reacting a specific diisocyanate with specific diols and controlling the reaction to form a specific polyol with hydroxyl termination, and then further reacting such a polyol with a separate polyisocyanate to form a coating composition. The Examiner's mere conclusion that "the reference teaches the same product as claimed" based on an unfounded allegation that Reich teaches the same components reveals that the Examiner has failed to recognize and give weight to specific claim limitations, and has failed to demonstrate how the reference teaches, discloses, or even remotely suggests such limitations. Accordingly, the Examiner has failed to establish a prima facie case of obviousness, since Reich fails to teach or suggest these claim limitations.

In conclusion, it is apparent from the above remarks that Reich fails to teach, disclose or suggest the polyurethane polyol of the present invention comprising the hydroxyl-terminated reaction product of a diisocyanate with an aliphatic diol and a polymeric diol as claimed, let alone a coating composition as the further reaction product of such a polyol with a polyisocyanate. Accordingly, it is respectfully submitted that the rejections based on Reich under 35 U.S.C. §102(b) and §103(a) are improper, and that all of claims 1-23

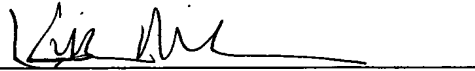
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are allowable. Applicant therefore respectfully urges that the Board reverse the Examiner's rejections of the claims.

Respectfully submitted,

Date: January 24, 2006



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CLAIM APPENDIX

1. A trimeric unsymmetrical polyurethane polyol comprising the reaction product of:
 - a) a diisocyanate;
 - b) an aliphatic diol having 1-6 carbon atoms; and
 - c) a polymeric diol having at least one oxycarbonyl linkage and having from 5-20 carbon atoms,wherein the polyurethane polyol includes hydroxyl termination.
2. A polyurethane polyol as in claim 1, wherein the diisocyanate is selected from the group consisting of 2,2,4-trimethylhexamethylene diisocyanate, 1,6-hexamethylene diisocyanate, 1,1'-methylene-bis-(4-isocyanatocyclohexane), 4,4'-methylene-bis-(cyclohexyl diisocyanate), hydrogenated toluene diisocyanate, 4,4'-isopropylidene-bis-(cyclohexyl isocyanate), 1,4-cyclohexyl diisocyanate, 4,4'-dicyclohexyldiisocyanate, and 3-isocyanato methyl-3,5,5-trimethylcyclohexyl diisocyanate, and mixtures and combinations thereof.
3. A polyurethane polyol as in claim 1, wherein the diisocyanate is aliphatic.
4. A polyurethane polyol as in claim 1, wherein the aliphatic diol is selected from the group consisting of 1,2-propanediol, ethyl-1,3-hexanediol, 1,6-hexanediol, 2-methyl propanediol, and 1,5-pentanediol, and mixtures and combinations thereof.
5. A polyurethane polyol as in claim 1, wherein the aliphatic diol includes an odd number of carbon atoms.

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6. A polyurethane polyol as in claim 1, wherein the polymeric diol is selected from the group consisting of polycarbonate diols and polycaprolactone diols, and mixtures thereof.

7. A polyurethane polyol as in claim 1, wherein the diisocyanate is 2,2,4-trimethylhexamethylene diisocyanate, wherein the aliphatic diol is 1,5-pentanediol, and wherein the polymeric diol is polyoxohexylene carbonate diol.

8. A polyurethane polyol as in claim 1, wherein the ratio of the diisocyanate:aliphatic diol:polymeric diol is from about 1:1.9:0.1 to about 1:1.1:0.9

9. A polyurethane polyol as in claim 1, wherein the reaction product comprises a low viscosity, non-crystalline substantially 100 percent solids material.

10. A coating composition comprising the reaction product of:
a) a hydroxy-terminated polyurethane polyol precursor comprising the reaction product of:
i) a diisocyanate;
ii) an aliphatic diol having 1-6 carbon atoms; and
iii) a polymeric diol having at least one oxycarbonyl linkage and having from 5-20 carbon atoms; and
b) a polyisocyanate.

11. A coating composition as in claim 10, wherein the polyisocyanate is selected from the group consisting of 2,4,6-trioxo-1,3,5-tris(6-isocyanatohexyl)hexahydro-1,3,5-triazine, N-isocyanatohexylaminocarbonyl-N,N'-bis(isocyanatohexyl)urea, the biuret of

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hexanediisocyanate, polymeric methane diisocyanate, and polymeric isophorone diisocyanate.

12. A coating composition as in claim 10, wherein the composition further comprises a catalyst for promoting reaction of the polyurethane polyol precursor with the polyisocyanate.

13. A coating composition as in claim 10, wherein the catalyst is selected from the group consisting of dibutyltin dilaurate, dibutyltin diacetate, stannous octoate, butyl stannic acid, and bismuth carboxylate.

14. A coating composition as in claim 10, wherein the composition further comprises one or more additives selected from the group consisting of antioxidants, colorants, UV absorbers, light stabilizers, and surfactants.

15. A coating composition as in claim 10, wherein the diisocyanate of the polyurethane polyol precursor is selected from the group consisting of 2,2,4-trimethylhexamethylene diisocyanate, 1,6-hexamethylene diisocyanate, 1,1'-methylene-bis-(4-isocyanatocyclohexane), 4,4'-methylene-bis-(cyclohexyl diisocyanate), hydrogenated toluene diisocyanate, 4,4'-isopropylidene-bis-(cyclohexyl isocyanate), 1,4-cyclohexyl diisocyanate, 4,4'-dicyclohexyldiisocyanate, and 3-isocyanato methyl-3,5,5-trimethylcyclohexyl diisocyanate, and mixtures and combinations thereof.

16. A coating composition as in claim 10, wherein the aliphatic diol is selected from the group consisting of 1,2-propanediol, ethyl-1,3-hexanediol, 1,6-hexanediol, 2-methyl propanediol, and 1,5-pentanediol, and mixtures and combinations thereof.

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17. A coating composition as in claim 10, wherein the polymeric diol is selected from the group consisting of polycarbonate diols and polycaprolactone diols, and mixtures thereof.

18. A coating composition as in claim 10, wherein the polyurethane polyol precursor comprises the reaction product of 2,2,4-trimethylhexamethylene diisocyanate, 1,5-pentanediol, and polyoxohexylene carbonate diol.

19. A coating composition as in claim 18, wherein the polyurethane polyol precursor is further reacted with 2,4,6-trioxo-1,3,5-tris(6-isocyanatohexyl)hexahydro-1,3,5-triazine in the presence of dibutyltin dilaurate as a catalyst.

20. A substrate having a coating on at least one surface thereof, said coating comprising the reaction product of:

a) a hydroxy-terminated polyurethane polyol precursor comprising the reaction product of:

- i) a diisocyanate;
- ii) an aliphatic diol having 1-6 carbon atoms; and
- iii) a polymeric diol having at least one oxycarbonyl linkage and having from 5-20 carbon atoms; and

b) a polyisocyanate.

21. A substrate as in claim 20, wherein the substrate is glass.

22. A substrate as in claim 20, wherein the substrate comprises a polymeric material.

23. A substrate as in claim 22, wherein the substrate comprises a polycarbonate sheet.

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EVIDENCE APPENDIX

None.

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RELATED PROCEEDINGS APPENDIX

None.